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HACCP SYSTEM APPLICATION IN THE WHEAT SUPPLY CHAIN

Abstract: *The supply chain for wheat includes a set of processes and activities related to transportation, storage, handling operations, packaging and other services necessary for goods delivery to the user. Each of these services represent a potential place of risk and hazards that can lead in lowering of the crops quality and safety level and their damage. High quality wheat supply chain involves the use of standards and procedures in the complete logistic chain. In this paper was considered in detail HACCP system and its application in various segments of the wheat supply chain.*

Keywords: HACCP system, Supply chain, Wheat.

1. INTRODUCTION

In the supply chain for wheat the most important aspects are quality and safety. As a result of efforts in the area of organized and scientifically based system of quality control and food safety, has been developed and 1971. was presented to the public, the concept of Hazard Analysis and Critical Control Points - HACCP. During the time the system is developed and upgraded. HACCP system is necessary to apply in all areas of supply chain. It consists of two components: HA - Hazard Analysis, hazard identification in each stage of production and delivery of food and estimation importance of these threats to human health and the CCP - Critical Control Points in the food chain in which can be reduced or completely eliminate risk for food safety [1].

2. HACCP SYSTEM

HACCP is one of the first food safety management systems. Since 2001. the ISO is taking significant action with a view to developing standards based on HACCP and 2005. appears standard ISO 22000:2005. The main characteristics of this standard are:

- Focus on the management system for food safety,
- Standard can be used by all organizations involved in the supply chain,
- Can be used as element of external certification
- A standard provides that process for food safety controlling will be verified, implemented, monitored and managed.

ISO 22000:2005 is integrated standard that includes HACCP and ISO 9000. It represents progress in relation to HACCP system (which more relating technology and control of critical points in production). ISO 22000:2005 includes analysis and risk control and food safety in the complete supply chain and includes:

- Requirements for good manufacturing practices,
- Requirements for the HACCP principles,
- Requirements for management system.

The system includes equipment, materials, packaging, hygiene products, additives, ingredients, etc.

From 1 January 2006. standards of food safety (HACCP in the first place) are required on EU and World Trade

Organization markets. All who come into contact with the product at any stage of his treatment, processing, distribution should apply HACCP principles, which provide "traceability" and products monitoring. In complete supply chain (Figure 1) each link of the supply chain is part of a complex

HACCP system. At each stage of supply chain can occur unforeseen and unexpected circumstances that could lead to physical, chemical or biological threat to the grain safety [2].

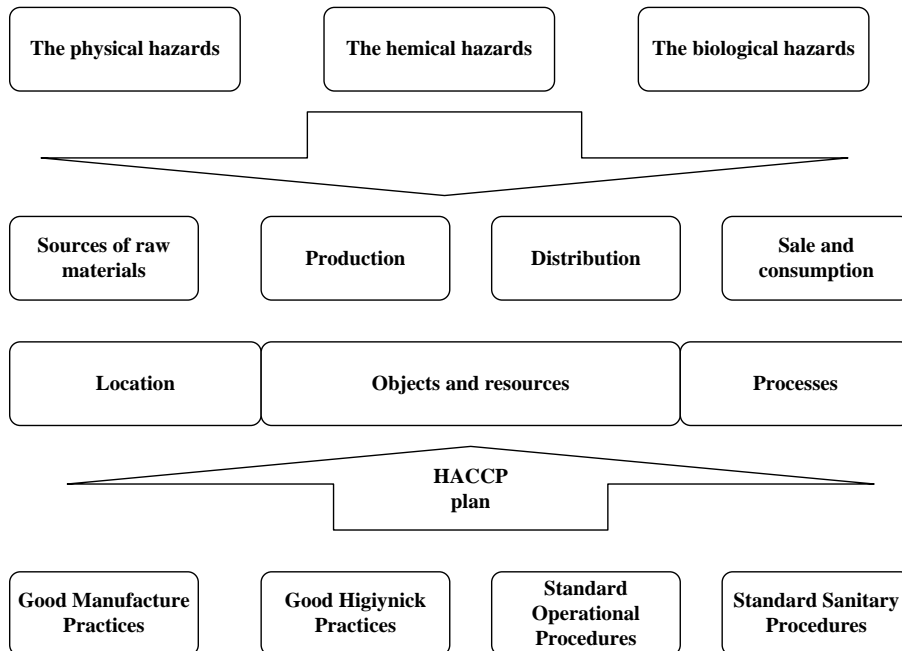


Figure 1. HACCP system for supply chain

3. HACCP SYSTEM IN THE WHEAT SUPPLY CHAIN

Important elements of HACCP in processes of supply chain for wheat are the characteristics of products, primarily packaging, transport packaging, requirements for goods handling, conditions of storage, transport conditions.

To identify places of possible hazards and risks to it is necessary set the program to encompass all processes in the supply chain. The program means that each subsystem of the supply chain must provide the conditions necessary to protect the grain while they are in their jurisdiction. This is realized by by

applying Good Manufacture Practices and Good Higiynick Practices. It is the precondition for the HACCP plans creating.

4. HACCP PLAN FOR WHEAT SUPPLY CHAIN

HACCP plan is a written document based on HACCP principles and describes the procedures applied during the HACCP system implementation.

There are 12 steps and seven principles on which based development of the HACCP plan and HACCP system: HACCP team establishment, product description and method of their

distribution, product purposes description and identification the food buyer, the development of flow charts, flow diagrams verification, execution of risk analysis (P1), CCP determination (P2), establishing critical limits (P3), establishing a monitoring system (P4), corrective actions establishment (P5), establishing procedures for system verification (P6), establishment of documentation and record keeping procedures (P7). The first 5 steps represent the initial phase, and the remaining 7 refers to the application of the seven HACCP principles. Preparatory activities include: staff training, providing necessary resources, good manufacturing and hygiene practices, continuous control, monitoring, products recall (Figure 2).

To be able to implement the HACCP plan must be made hazard analysis (Table 1) and identifying critical control points (Table 2). For each process need define the risk, hazard causes, the significance level of risk and preventive actions. In the supply chain for wheat should take into account subsystems location, objects, tools, equipment and processes [4].

After analysis of the potential hazards for the grain safety need assess risk (based on the assessment of probability of appearance-small, medium, high) risk event and the severity of consequences for the health of users or the reputation of the manufacturer (large, medium or small).

On the Figure 3 is given flow chart of

the receipt of grain and in Figure 4 a flow chart of technological processes in the storage for wheat. Table 3 shows types, causes and preventive actions for the risks that accompany the process of grain storage [5].

5. CONCLUSION

HACCP is a powerful tool with application to the control of mycotoxins in the commodity system. Undertaking a HACCP study focuses the thinking of everyone involved with the product on the details of the process, and promotes a greater awareness of safety issues. Implementation of a HACCP system is not an end in itself. The ongoing maintenance of the HACCP plan is where the benefit really lies.

Using the HACCP process to manage food safety in your business will help you to:

PLAN - what needs to be done and write it down;

DO - what you planned to do to maintain food safety;

CHECK - that you are doing what you planned to do to maintain food safety and write down what was checked and when; and

ACT - to correct any food safety problems and write down what has been done about the problem and when.

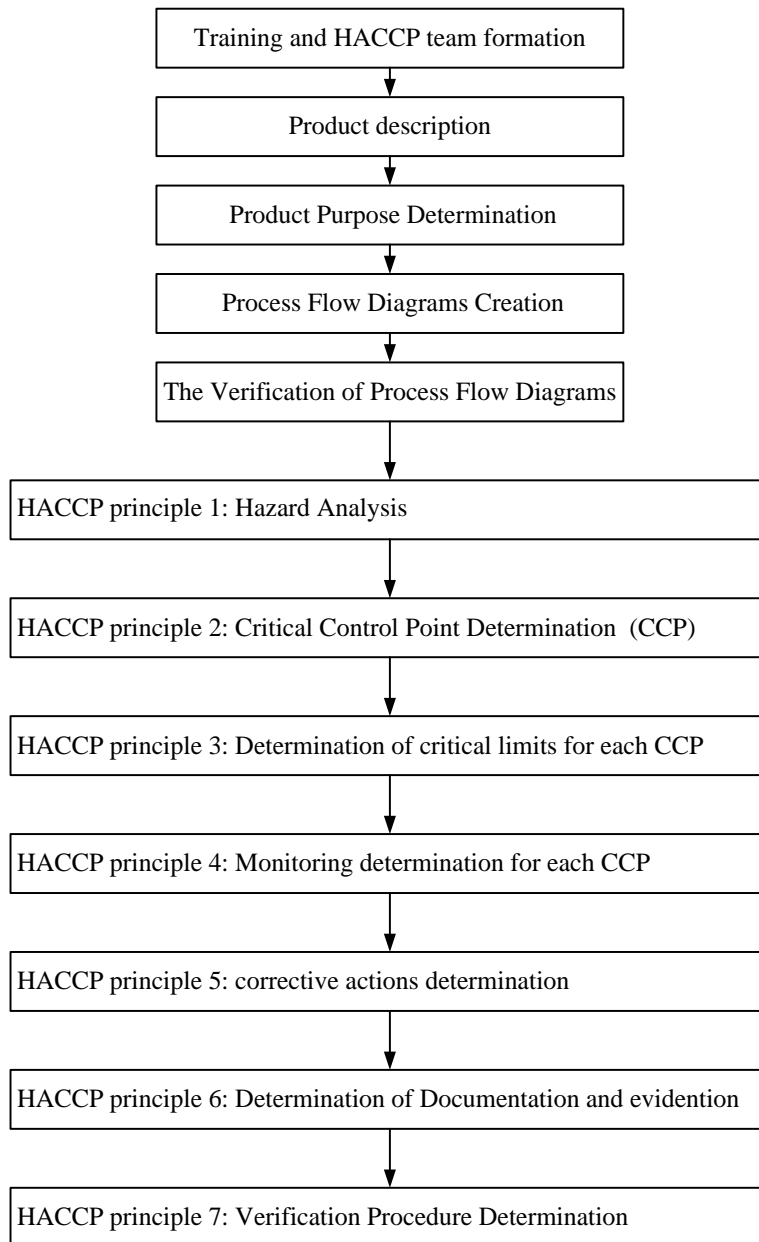


Figure 2. HACCP plan for wheat supply chain

Table 1. Hazard analysis

HAZARD ANALYSIS												
Product: GRAIN											sheet __ of __	
⇐ Principle 1 ⇒						⇐ Principle 2 ⇒						
Operation	Risk	Cause	P (H M L)	O (H M L)	Method of inconsist. eliminat.	P1	P2	P3	P4	P5	CC P	reason
Grain Receive	BIOLOGICAL											
	insects, fungi	contamination in the fields or due irregular storage	L	L	managing suppliers	yes	yes	no	yes	yes	no	In the further steps risk will be elimin
	CHEMICAL											
	pesticide residues and mycotoxins	incorrect use of funds for grain protection	L	M	Managing suppliers	yes	no	yes	-	-	no	CP
	PHYSICAL											
	by-products remains contaminants from the environment	incorrectness of agricultural machinery in the harvest	M	L	managing suppliers	yes	no	no	-	-	no	CP
Management representative												

Table 2. Critical control points identification

CRITICAL LIMITS				Date:
				Sheet/ sheets:
No	Hazard	CCP Label	Critical limit(s)	The document upon which was made the decision about critical limit
1.	CHEMICAL – Microtoxins	01 CCP	Aflatoxin (B1 + G1) not more than 5 micrograms / kg Zearalenone no more than 1 microgram / kg	Regulation on the amount of pesticides, metals and metalloids and other toxic substances, chemotherapeutics, anabolics and other substances which can be found in food (Official Gazette no. 5/92, 11/92 corr. 32/2002
2.	PHYSICAL - Uncontrolled phenomenon in the mill process, which resulted in the appearance of impurities	02 CCP	Without uncontrolled occurrences	Good Manufacture Practices
HACCP team leader				

Table 3. Types, causes and preventive actions for risks in the process of grain storage

HAZARDS	CAUSES	PREVENTIVE ACTIONS
PHYSICAL HAZARDS		
1. The presence or introduction foreign materials and dirt 2. Physical damage of goods	1. Incorrect handling 2. Incorrect packaging, reloading, transport and storage technology	1. Careful manipulation 2. Adequately trained workers 3. Clear instructions for perform operations 4. Engagement of the selected transporter 5. Purchase of selected suppliers 6. Physical and quantitative control of the goods on receipt
CHEMICAL HAZARDS		
1. Presence of chemicals in the production, storage and transport process	1. Incorrect manipulation with production 2. Damage of the original packaging 3. Contamination during storage cleaning 4. Contamination during treatment with chemicals for pest control 5. Inadequate conditions of storage (moisture, temperature etc.)	1. Careful handling in the manipulation process 2. Application of FIFO principles 3. Limited storage time 4. Air conditioning and temperature and humidity control 5. Stored products control
BIOLOGICAL HAZARDS		
1. Presence of microorganisms in the final product	1. Physical damage of packaging 2. Inadequate conditions of production 3. Inadequate conditions of storage from producer 4. Inadequate conditions of transport 5. Expired lifetime	1. Purchase of selected suppliers 2. Admission control and quality and microbiological safety certificates (of the supplier or authorized laboratory)

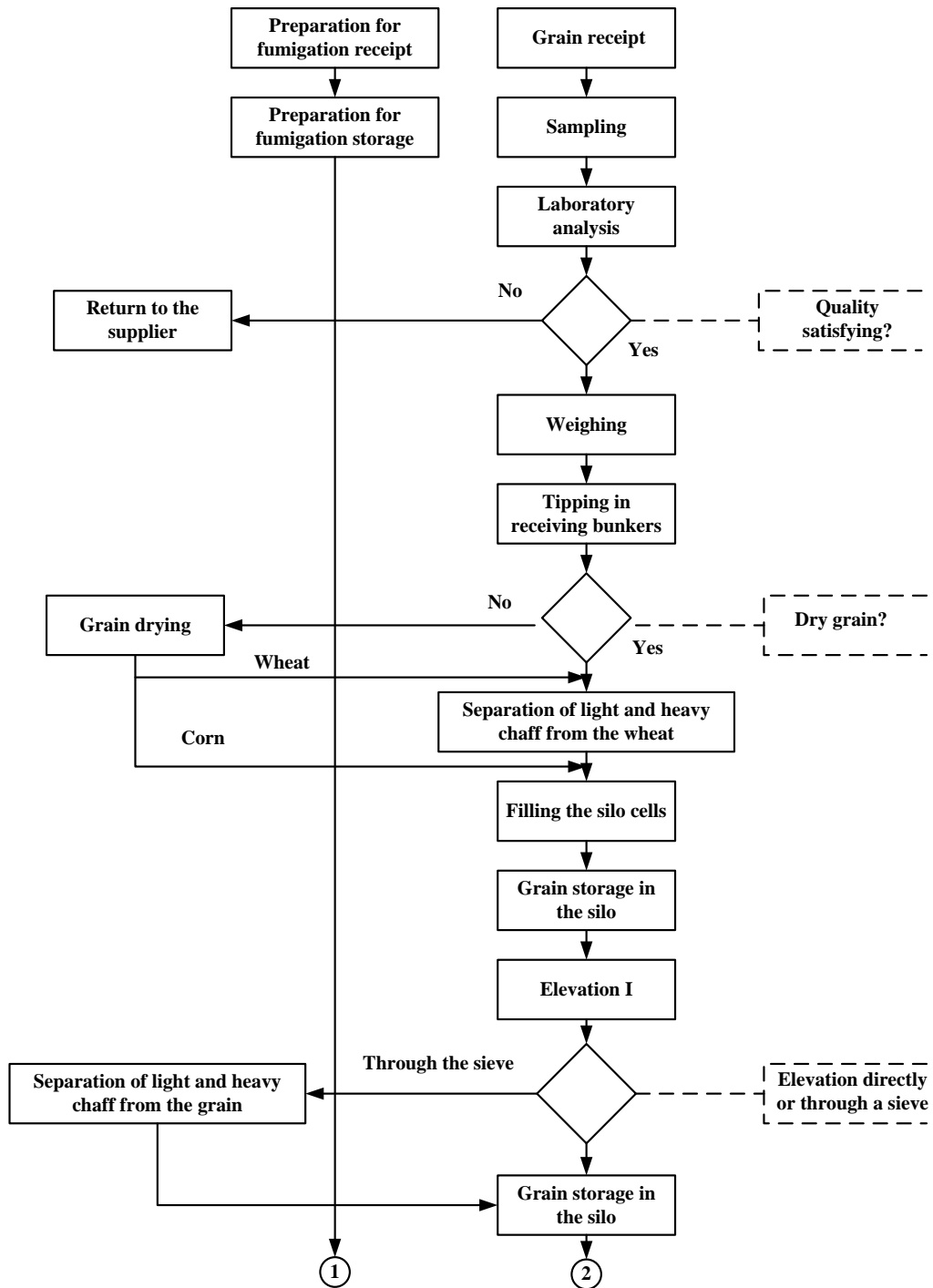


Figure 3. Flow chart of the grain receipt

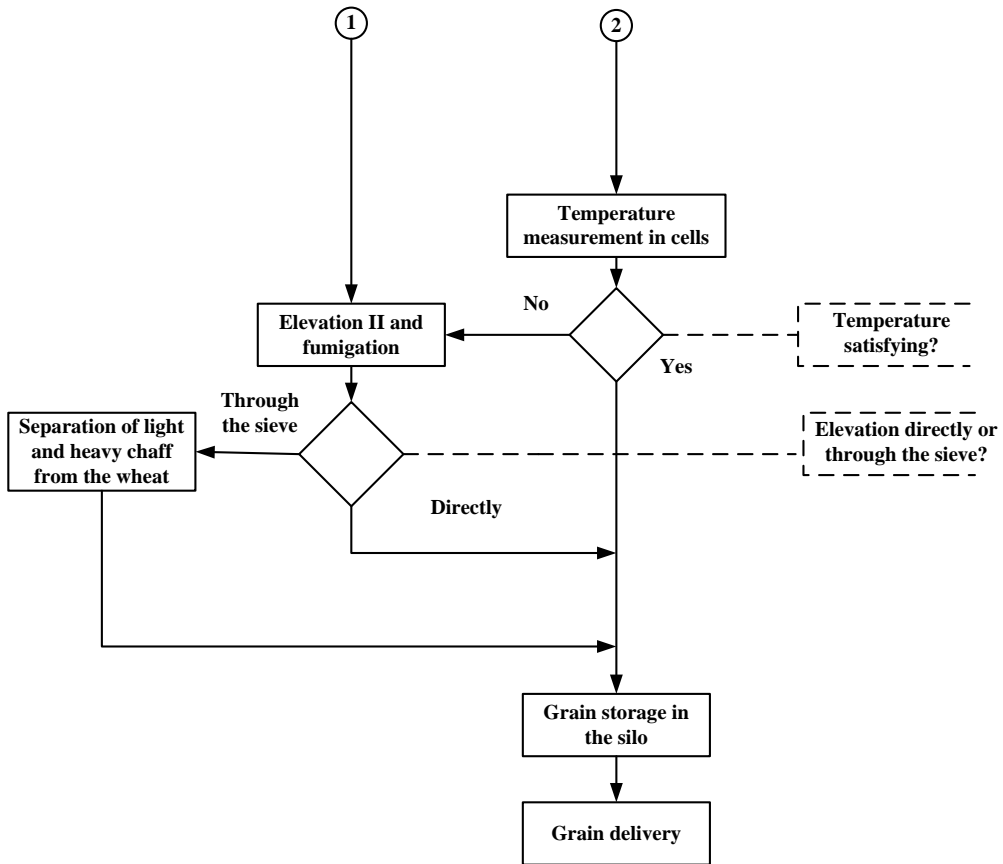


Figure 3. Flow chart of the grain receipt (continue)

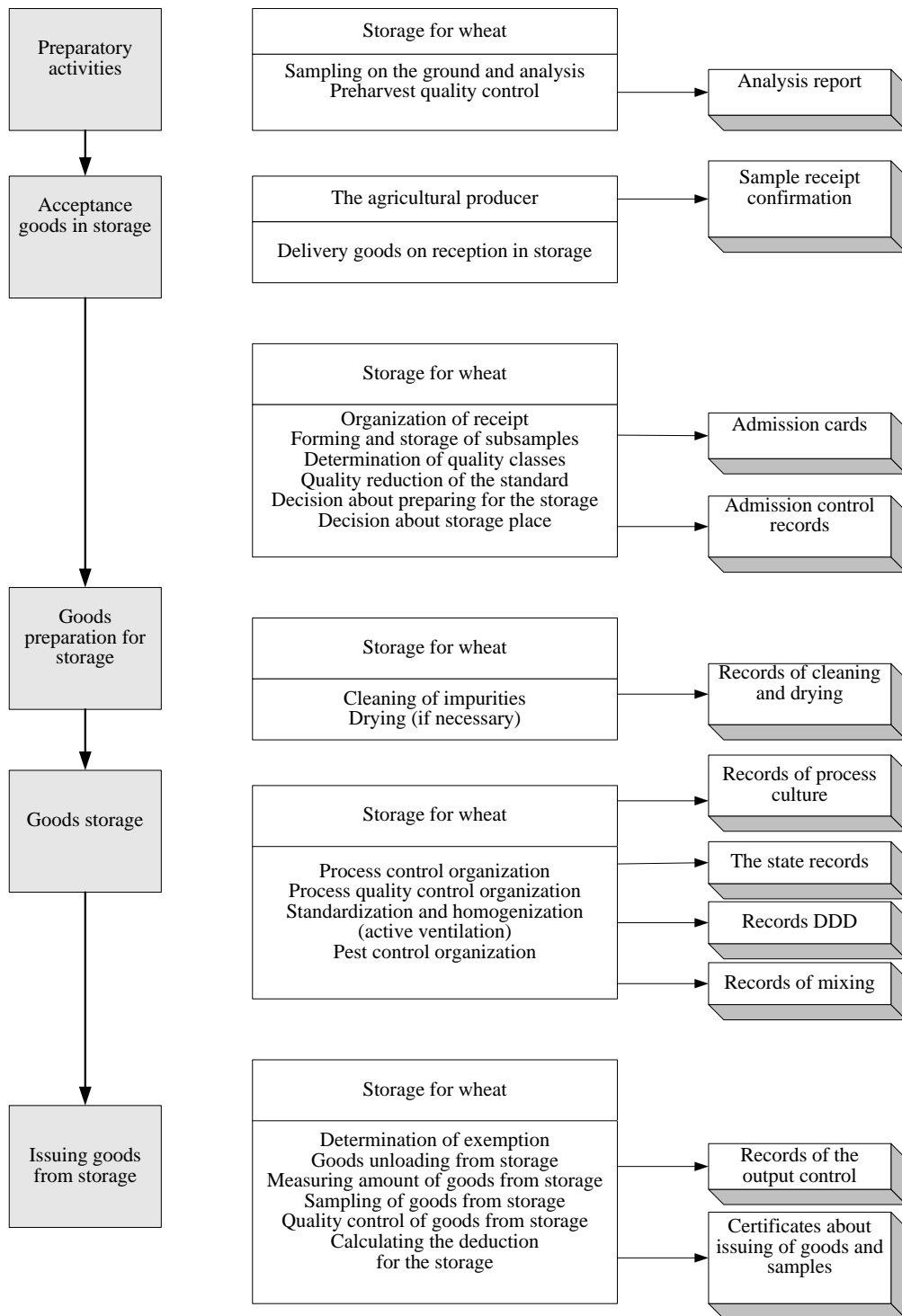


Figure 4. Flow chart of technological processes in the storage for wheat [6]

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